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(71) Applicant: UNILEVER PLC  
Unilever House Blackfriars  
London EC4P 4BQ(GB)

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Applicant: UNILEVER NV  
Burgemeester s'Jacobplein 1 P.O. Box 760  
NL-3000 DK Rotterdam(NL)

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(72) Inventor: Birtwistle, David Howard  
18 Exmoor Close, Irby

Wirral, Merseyside L61 9QN(GB)

Inventor: Marti, Vernon Peter John  
44 Donne Avenue, Spital  
Wirral, Merseyside L63 9YH(GB)

(74) Representative: Tonge, Robert James et al  
UNILEVER PLC Patents Division P.O. Box 68  
Unilever House  
London EC4P 4BQ(GB)

(54) Hair conditioning composition.

(57) A hair conditioning composition, intended to be rinsed off, after application, contains an aqueous phase and a lamellar phase including cationic surfactant. An oily sunscreen material is included. Fatty/oily material other than sunscreen and capable of forming a third phase is restricted so that the sunscreen is present in the lamellar phase. Because of this loss of the sunscreen on rinsing is reduced.

EP 0 419 164 A1

**HAIR CONDITIONING COMPOSITION****BACKGROUND OF THE INVENTION**

The present invention relates to hair conditioning compositions intended to be applied to hair and then rinsed off. More particularly, the invention relates to hair conditioning compositions containing sunscreen materials to protect the hair from the harmful effects of sunlight.

5 Dark hair exposed to sunlight fades, oriental black hair takes on a reddish tinge, and blond hair tends to turn yellow. The hair becomes rougher and drier to the touch after prolonged exposure to sunlight and also tends to lose its glossy appearance.

10 The hair can be protected from damage by exposure to sunlight by coating the hair fibers with an effective sunscreen.

Conventional hair conditioning compositions intended to be applied to hair and then rinsed off are generally made up of three phases, a first lamellar phase made up of cationic surfactant and long chain fatty alcohol, a second aqueous phase which is mainly water with some micellar cationic surfactant and a third fatty (oily) phase consisting of fatty alcohol and fatty thickeners, for example stearyl stearate, glyceryl 15 monostearate or paraffin wax.

When oil-soluble sunscreen material is introduced into the above conventional hair conditioning composition it partitions preferentially into the fatty phase. When the composition is rinsed from the hair, the fatty phase which contains most of the sunscreen is washed away, and little sunscreen benefit is retained by the hair. Any sunscreen which is deposited is contained in fatty lumps and does not spread to give even 20 protection over the whole of the hair shaft.

Water-soluble sunscreen would be washed away by the rinsing water in the final rinsing step of the conditioning treatment, and is therefore unsuitable for use in conditioning compositions.

Attempts have been made to overcome the problems of rinsing away sunscreen benefits from the hair. For example, US 4 104 368 (Millmaster) discloses hair and skin compositions for conditioning and 25 protecting against UV damage, which comprise water-soluble compounds made up of long chain quaternary ammonium cations and acidic water-soluble sunscreen anions. The cationic moiety is thought to give the compounds some substantivity to skin and hair.

EP-A-193392 (Revlon) discloses a mousse product intended to be applied to hair and left on the hair (not rinsed off). It contains water-soluble sunscreen, or sunscreen dissolved in an aqueous alcohol phase.

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**BRIEF SUMMARY OF THE INVENTION**

We have found that by effectively excluding the fatty phase from a hair conditioner composition and 35 including a sunscreen which is an oil, the amount of sunscreen which is rinsed away can be substantially reduced and correspondingly the amount which remains available for retention on the hair is increased.

Broadly, the invention provides a hair conditioning composition comprising a lamellar phase, which lamellar phase comprises an oil sunscreen material.

More specifically, the invention provides a hair conditioning composition comprising a first, aqueous 40 phase and a second, lamellar phase including cationic surfactant, characterized in that the composition comprises an oil sunscreen material and the composition is in two phases with the oil sunscreen material present in the lamellar phase.

The composition may optionally further comprise an oil-soluble sunscreen material.

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**DETAILED DESCRIPTION OF THE INVENTION**

In the hair conditioning composition according to the invention, the level of fatty material able to form a third, fatty/oily phase is low, and the oil sunscreen material and the optional oil-soluble sunscreen material 50 are found in the lamellar phase. It is thought that when the hair conditioning composition is applied to the hair, it is the lamellar phase which deposits onto and lubricates the hair. The sunscreen material is carried onto the hair by the lamellar phase and deposits in an even coating, giving uniform protection.

**Lamellar phase**

The lamellar phase contains cationic surfactant. Generally it also contains long chain fatty alcohol.

The cationic surfactant will generally function as a hair conditioning agent (as will be mentioned again below) but other hair conditioning agents may be present in addition.

The amount of surfactant present in the composition will generally be from 0.01 to 5% by weight, preferably 0.1 to 5%, more preferably 0.1 to 1% by weight.

Examples of cationic surfactant include

Cetyl trimethylammonium chloride  
Stearyl dimethylbenzyl ammonium chloride  
Cetylpyridinium chloride  
10 Quaternium-5  
Quaternium-31  
Quaternium-18  
and mixtures thereof

Long chain fatty alcohol which is present may have fatty alkyl or alkenyl chains with 14 to 22 carbon atoms, preferably 16 to 20. Fatty alcohol which is particularly suitable for use in conjunction with cationic surfactant is a mixture of cetyl and stearyl alcohols, customarily referred to as "cetostearyl alcohol".

The use of fatty alcohol with cationic surfactant is a known technique for retaining cationic surfactant in lamellar phase. The amount of fatty alcohol is desirably the minimum required for this purpose plus a slight excess. Any more fatty alcohol is undesirable for this invention as it will contribute to a separate third phase. The appropriate weight ratio can be determined by making mixtures in various proportions and examining them for free fatty material as described below. For cetyl trimethyl ammonium chloride used in conjunction with a mixture of cetyl and stearyl alcohols, a suitable weight ratio of cationic surfactant to fatty alcohol is in the range 1:1.3 to 1:2 preferably 1:1.3 to 1:1.6.

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#### Sunscreen materials

The hair conditioning composition of the invention comprises an oil sunscreen material, preferably in an amount of from 0.1 to 10% by weight, most preferably from 0.2 to 2% by weight.

30 Examples of suitable oil sunscreen materials are 2-ethylhexyl-p-methoxy Cinnamate, sold commercially as Parsol MCX, 2-ethoxyethyl-p-methoxy cinnamate, sold commercially as Giv-Tan F, isoamyl-p-methoxycinnamate, sold commercially as Neo-Heliopan E1000, 2-ethylhexyl-p-dimethylaminobenzoate sold commercially as Escalol 507 and ethyl dihydroxypropyl-p-aminobenzoate sold commercially as Amerscreen P.

35 The lamellar phase of the hair conditioning compositions of the invention preferably further comprises a sunscreen material which is not itself an oil but is oil-soluble. Such materials will generally be oil-soluble solids and suitably are used in an amount of from 0.1 to 8% by weight, preferably from 0.2 to 2% by weight.

40 Examples of preferred oil-soluble sunscreens are benzophenone derivatives such as 4,4'-tetrahydroxybenzophenone, sold commercially as Uvinul D50, and 2-hydroxy-4-methoxy-benzophenone, sold commercially as Eusolex 4360, dibenzoyl methane derivatives such as t-butyl-4-methoxydibenzoyl methane, sold commercially as Parsol 1789, and isopropyldibenzoyl methane, sold commercially as Eusolex 8020:

When the composition comprises oil-soluble sunscreen, the oil-soluble sunscreen dissolves in the oil sunscreen and is contained in the lamellar phase. It is then retained on the hair together with the oil sunscreen.

45 It is preferred that the total amount of sunscreen material, i.e. oil sunscreen material and oil-soluble sunscreen material, in the hair conditioning composition does not exceed 10% by weight. Little increase in protection is seen when the composition contains over 10% by weight of sunscreen material, and the hair tends to take on a greasy appearance.

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#### Free fatty material

The hair conditioning composition of the invention is essentially a two-phase composition which contains very low levels of free fatty material. In this context, "free fatty material" means fatty material which is not bound up in the lamellar phase and can form a third, fatty/oily phase. The term excludes the sunscreen material. The amount of free fatty material is sufficiently low, preferably less than 0.4% by weight of the composition, that the oil sunscreen material is present in the lamellar phase.

The amount of free fatty material in a hair conditioner composition can be detected upon ultracen-

trifugation at approximately 36000 rpm for 2 hours. The composition separates into layers and any free fatty material present will form the least dense layer which rises to the top. The next layer is the lamellar phase, and in the composition of the invention which contains essentially no fatty phase, it is this lamellar phase which contains most of the sunscreen material. The remaining liquid layer consists essentially of water.

- 5 On centrifugation of a conventional hair conditioning composition comprising cationic surfactant, long chain fatty alcohol and fatty thickeners the sunscreen material partitions such that the fatty layer contains about 39% by weight of the total amount of sunscreen present in the composition, the lamellar phase contains about 49.7% by weight and the aqueous liquid phase contains about 11.3% by weight.

- 10 The hair conditioning composition of the invention which contains substantially no fatty phase partitions on centrifugation such that the lamellar phase contains about 81.5% by weight of the total amount of sunscreen and the aqueous liquid phase contains about 18.5% by weight.

It can be seen that the amount of unbound sunscreen available for coating the hair fibers is greatly increased in the composition of the invention.

- 15 Generally the total amount of fatty material present in the composition and which is capable of contributing to formation of a separate fatty/oily third phase containing at least part of that fatty material is less than 5% by weight of the composition, generally well below 5%.

If the hair conditioning composition of the invention does contain low levels of free fatty material, this will be due mainly to perfumes and other minor ingredients which are fatty in nature.

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### Conditioning Agents

The cationic surfactant included in compositions of this invention serves as a hair conditioning agent. The compositions may also comprise other conditioning agents which may be chosen from cationic polymers, involatile silicones, volatile silicones, protein hydrolysates or quaternised protein hydrolysates.

- 25 Suitable cationic polymers include  
 Guar Hydroxypropyltrimonium chloride  
 Quaternium-19  
 Quaternium-23  
 30 Quaternium-40  
 Quaternium-57  
 Poly (dimethyldiallylammonium chloride)  
 Poly (dimethylbutenyl ammonium chloride)- $\alpha,\omega$ -bis (triethanolammonium chloride)  
 Poly (dipropylidiallylammonium chloride)  
 35 Poly (methyl- $\beta$ -propaniodiallylammonium chloride)  
 Poly (diallylpiperidinium chloride)  
 Poly (vinyl pyridinium chloride)  
 Quaternised poly (vinyl alcohol)  
 Quaternised poly (dimethylaminoethylethacrylate) and mixtures thereof.

- 40 Examples of suitable volatile silicone materials include cyclomethicone, available commercially as Dow Corning DC 345, and Volatile Silicone 7158, available from Union Carbide.

The involatile silicones which may be used in the compositions of the invention are generally amino functional polydimethylsiloxanes. Examples include amodimethicone available commercially as Dow Corning DC 929 and trimethylsilylmodimethicone, available as Dow Corning Q 8220.

- 45 Suitable protein derivatives include lauryl dimonium hydroxy propylamino hydrolysed animal protein, available commercially under the trade name LAMEQUAT L, and hydrolysed keratin containing sulphur-bearing amino acids, available commercially under the trade name CROQUAT WKP.

The hair conditioning composition of the invention preferably comprises from 0.01 to 5% by weight, most preferably from 0.1 to 1% by weight of conditioning agent(s) including the cationic surfactant.

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### Other ingredients

- 55 The hair conditioning composition of the invention may be thickened by means of a neutral polymer. Suitable thickening agents include guar gum, available as Jaguar Gum or Jaguar Plus, hydroxypropyl guar, available as Jaguar HP 60, xanthan gum, available as Kelzan, and hydroxyethylcellulose, available as Natrosol 150 or Natrosol 250HR.

The composition may also comprise minor amounts of other ingredients which are commonly employed

in hair conditioners. Examples of such ingredients include viscosity-adjusting agents, opacifiers, pearlescers, perfumes, colouring agents, preservatives and buffering agents.

5 Examples

The invention is further illustrated by the following Examples.

10 Example 1

		% wt
15	Cetostearyl alcohol	0.94
	Cetyl trimethylammonium chloride (50% aqueous solution)	1.4
	Natrosol 250 HR	1.25
	Polystyrene latex	1.5
20	Parsol MCX	1.0
	Perfume, preservative	qs
	Water	to 100

25 The Natrosol 250 HR is dissolved in water and heated to 80 °C. Cetostearyl alcohol and cetyl trimethylammonium chloride are mixed together and added to the Natrosol 250 HR solution with mixing. The mixture is cooled with stirring, and the remaining ingredients except Parsol MCX are added. Finally Parsol MCX is added with stirring.

30 The following hair conditioning compositions may be made by following the method outlined in Example 1 above.

	Example 2	% wt
35	Cetostearyl alcohol	1.01
	Cetyl trimethylammonium chloride (50% aqueous solution)	1.50
	Jaguar HP60	1.0
	Escalol 507	2.0
40	Eusolex 4360	0.5
	Polystyrene latex	1.4
	Perfume, preservative	qs
	Water	to 100

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	Example 3	% wt
50	Cetostearyl alcohol	0.81
	Cetyl trimethylammonium chloride (50% aqueous solution)	1.20
	Natrosol HHXR	1.06
	Neo Heliolan E1000	2.5
55	Parsol 1789	0.5
	Perfume, preservative	qs
	Water	to 100

<u>Example 4</u>		<u>% wt</u>
5	Cetostearyl alcohol	1.21
	Cetyl trimethylammonium chloride (50% aqueous solution)	1.80
	Natrosol 250HR	1.2
	Amerscreen P	1.5
	Eusolex 4360	0.3
10	Polystyrene latex	1.0
	Perfume, preservative	qs
	Water	to 100

<u>Example 5</u>		<u>% wt</u>
15	Cetostearyl alcohol	0.94
20	Cetyl trimethylammonium chloride (50% aqueous solution)	1.40
	Jaguar C-13-5	1.0
	ParSol MCX	3.0
	Eusolex 8020	0.75
25	Perfume, preservative	qs
	Water	to 100

30           **Claims**

1. A hair conditioning composition comprising a first, aqueous phase and a second, lamellar phase including cationic surfactant, characterised in that the composition comprises an oil sunscreen material which material is present in the lamellar phase.
2. A hair conditioning composition as claimed in claim 1 wherein the oil sunscreen material is present in an amount of from 0.1 to 10% by weight.
3. A hair conditioning composition as claimed in claims 1 or 2 wherein the lamellar phase further contains an oil-soluble sunscreen material.
4. A hair conditioning composition as claimed in claim 3 wherein the oil-soluble sunscreen material is present in an amount of from 0.01 to 8% by weight.
5. A hair conditioning composition as claimed in any preceding claim wherein the total amount of sunscreen material in the composition does not exceed 10% by weight.
6. A hair conditioning composition as claimed in any preceding claim wherein the oil sunscreen material is chosen from 2-ethylhexyl-p-methoxycinnamate,
- 45       2-ethoxyethyl-p-methoxycinnamate,
- isoamyl-p-methoxycinnamate,
- 2-ethylhexyl-p-dimethylaminobenzoate and
- ethyl dihydroxypropyl-p-aminobenzoate.
- 50       7. A hair conditioning composition as claimed in claim 3 wherein the oil-soluble sunscreen material is chosen from 4,4'-tetrahydroxy-benzophenone,
- 2-hydroxy-4-methoxy-benzophenone,
- t-butyl-4-methoxydibenzoyl methane and isopropyldibenzoyl methane.
8. A hair conditioning composition as claimed in any preceding claim wherein the composition comprises less than 5% by weight of fatty material able to form a separate fatty/oily third phase comprising at least part of that fatty material.
- 55       9. A composition as claimed in any preceding claim wherein the amount of fatty or oil material other than sunscreen material which is present as a third phase is less than 0.4% by weight of the composition.

10. A hair conditioning composition as claimed in any preceding claim, comprising a hair conditioning agent other than the cationic surfactant.

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EUROPEAN SEARCH  
REPORT

Application Number

EP 90 31 0119

DOCUMENTS CONSIDERED TO BE RELEVANT					
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)		
X	MANUFACTURING CHEMIST, vol. 58, no. 11, November 1987, pages 62-63, London, GB; "Out in the sun" * Whole article - - -	1,2,3,6,8, 10	A 61 K 7/00 A 61 K 7/42		
Y	US-A-4 567 038 (REVLON) * Column 2, line 13 - column 3, line 7; claims 1-2 * - - -	1-7,10			
Y	EP-A-0 012 178 (HOFFMANN-LA ROCHE & CO.) * Page 15, line 11 - page 16, line 3 * - - -	1-7,10			
A	US-A-4 810 489 (BRISTOL-MEYERS CO.) * Columns 3-6 * - - - - -	1-10			
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)		
			A 61 K		
The present search report has been drawn up for all claims					
Place of search	Date of completion of search	Examiner			
The Hague	15 November 90	BERTOCCHI C.			
CATEGORY OF CITED DOCUMENTS					
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